# Caries Prevalence and Experience of 12-Year old Children in Montserrat

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***ABSTRACT***

***Objective:*** *The aim of this study was to determine the caries experience and oral health related quality of life of 12-year olds on the Caribbean island of Montserrat. In addition, any difference in the dental caries experience was explored by gender and socio-economic status.*

***Subjects and Method:*** *A total of forty- six 12-year olds were living on the island at the time of the study and 32 (69%) participated in the survey. Caries experience was recorded using the decayed, missing and filled teeth (DMFT) index by a trained and calibrated examiner according to the British Association for the Study of Community Dentistry (BASCD) criteria. The Care Index was used to describe the level of dental care. The Child Perception Questionnaire was used to investigate the impact of oral health conditions on oral health-related quality of life. Statistical software Dental Survey Plus and SPSS were used to analyse data.*

***Results:*** *The findings of this study showed that the 12-year olds had a mean DMFT of 1.91 and 59% had active untreated caries with an overall Care Index of 16%. While the perception of oral symptoms was low, over a third of children reported a functional impact as a result of their oral condition.*

***Conclusion:*** *It is concluded that there is a need for improved delivery of restorative care coupled with oral health promotion and dental health education.*

**Keywords:** Caries, DMFT, 12-year-olds

# Prevalencia de las Caries y Experiencia de Niños de 12 años en Montserrat

CE Fergus

***RESUMEN***

***Objetivo:*** *El objetivo de este estudio fue determinar la experiencia con las caries y la salud oral en relación con la calidad de vida de niños de 12 años en la isla caribeña de Montserrat. Además, las diferencias en la experiencia con las caries dentales fueron exploradas a partir del género y el estado socio-económico.*

***Sujetos y métodos:*** *Un total de cuarenta y seis niños de 12 años vivían en la isla en el momento del estudio y 32 (69%) participaron en la investigación. Se registró la experiencia con las caries usando el índice de DMFT por parte de un examinador entrenado y especializado, de acuerdo con los criterios de la Asociación Británica para el Estudio de Cirugía Dental Comunitaria (BASCD). El Índice de Cuidado fue usado para describir el nivel de cuidado dental. La Encuesta de Percepción del Niño fue usada para investigar el impacto de las condiciones de la salud oral sobre la calidad de vida relacionada con la salud oral. El software estadístico Dental Survey Plus y SPSS fueron usados para analizar los datos.*

***Resultados:*** *Los hallazgos de este estudio mostraron que los niños de 12 años tenían un promedio de DMFT de 1.91, y el 59% tenía caries activas no tratadas con un índice de Cuidado general de 16%. Aunque la percepción de síntomas orales fue baja, más de un tercio de los niños reportaron un impacto funcional como resultado de su condición oral.*

***Conclusión:*** *Se concluye que existe la necesidad de mejorar los servicios de cuidados restaurativos a la par con la promoción de la salud oral y la educación de la salud dental.*

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**Palabras claves:** Caries, DMFT, niños de doce años de edad

**West Indian Med J 2010; 59 (5): 574**

## INTRODUCTION

The primary aim of this study was to conduct an epidemiological survey of all 12-year olds on the island of Montserrat in order to determine the caries experience measured by the decayed, missing and filled teeth (DMFT) index and Oral Health Related Quality of Life (OHRQoL) of 12-year olds and to explore the differences in caries experience by gender and socio-economic status. No previous data could be found on the oral health status of Montserratian people and the oral data bank compiled by the World Health Organization (WHO) is devoid of any oral health data for the island. With inadequate previous data, this investigation may be timely as it will provide some baseline data for measurement of effectiveness of interventions to reduce caries in 12-year olds and could influence policymakers in the development of new oral health policies.

## SUBJECTS AND METHODS

Permission for conducting the survey was granted by the Ministry of Education (MOE) in Montserrat and also from the principal of the Montserrat Secondary School. Consent letters were distributed to parents of children on behalf of the researcher.

Separate training and calibration were carried out in line with BASCD guidelines for the conduct of surveys of child dental health (1, 2). Inter-examiner reliability between the author and the benchmark BASCD examiner was measured. For the fieldwork, the recorder was trained in recording data by the author who conducted all examinations. An assistant was responsible for co-ordinating the children.

In total, there were 46 pupils who all attended the only secondary school on the island. Positive consent was sought two days prior to the examination date March 14, 2007 and 32 students responded positively. The remaining students failed to return consent forms from parents and were therefore not permitted by school authority to take part in the study. Equipment comprised the following:

| | |
|---|---|
| CPITN probe | Disposable non-latex gloves |
| Sterile cotton gauze | Data recording sheets |
| Mouth mirror, Plane No. 4 | Desk |
| Dental face shield | Tikka Petzl-3LED head lamp |

Children presented to the examination room in no particular order. They were first asked to complete the "Child Oral Health Questionnaire". On completion of the questionnaire, it was returned to the assistant who recorded the child's name, date and parental occupation on data forms. Each child was given a data form and directed to the examination. Data forms were handed to the recorder who then went on to record data as instructed by the examiner.

Each child was asked to lie on the desk in a supine position with the examiner positioned directly behind. A Tikka Petzl (3LED) head lamp was used for a light source. Examination packs consisting of a sterile CPITN probe and sterile gauze and disposable mirrors were unwrapped by the dentist for each child.

Tooth surfaces were dried with sterile cotton gauze and examined in a standard order as specified by the study protocol. Following the examination, all instruments were placed in a "dirties" container and gloves disposed of in a clinical waste bag. No radiographs were taken. Any child requiring treatment was identified and the parent informed and advised by letter to seek appointment at the local dental clinic.

A standard cross-infection prevention protocol was followed. The examiner wore a face shield throughout the examination and gloves were changed after each patient. Five subjects were re-examined and statistical test applied to determine intra-examiner reliability.

Data were processed using Dental Survey Plus 2 version 2.1 and the Statistical Package for the Social Sciences (SPSS version 14) software for the purpose of obtaining descriptive statistics.

## RESULTS

High levels of agreement were recorded (Kappa=0.81) between the BASCD 'gold standard'/benchmark examiner and the author (Fergus CE). Of the 46 twelve-year olds in Montserrat, 32 participated in the survey. This gave a response rate of 69%. A description of the participants by gender and parental occupation is given in Table 1. There were slightly more boys than girls.

Table 1: Distribution of 12-year old participants by gender and father's occupation

| | | No. of children | % |
|---|---|---|---|
| **Gender** | Male | 18 | 56 |
| | Female | 14 | 44 |
| **Father's Occupation** | Legislators | 1 | 3 |
| | Professionals | 7 | 22 |
| | Technicians | 3 | 9 |
| | Clerks | 2 | 6 |
| | Service workers | 5 | 16 |
| | Skilled agricultural | 2 | 6 |
| | Craft & trade | 6 | 19 |
| | Plant & machine | 3 | 9 |
| | Elementary occupations | 0 | 0 |
| | Armed forces | 0 | 0 |
| | Not given | 3 | 9 |

The sample of 12-year olds had a mean DMFT of 1.91 [CI 1.05, 2.76] (Table 2). Fifty-nine per cent had experience

Table 2: Caries experience of 12-year olds in Montserrat

| | Mean | SD | Confidence Interval |
|---|---|---|---|
| D | 1.53 | 2.16 | 0.75 – 2.31 |
| M | 0.06 | 0.25 | -0.03 – 0.15 |
| F | 0.31 | 0.64 | 0.08 – 0.54 |
| **DMFT** | **1.91** | **2.37** | **1.05 – 2.76** |
| **Care Index %** | **16** | | |

SD = Standard deviation

of decay in one or more teeth [DMF > 0] (Fig. 1). Conversely, only 41% of the children were caries free. One child had recorded a DMFT of 11 (Table 3). Few restorations were recorded deriving a Care Index of 16%. Very few extractions had taken place. The participants had an average of 25.69 (CI 24.8, 26.58) sound teeth.

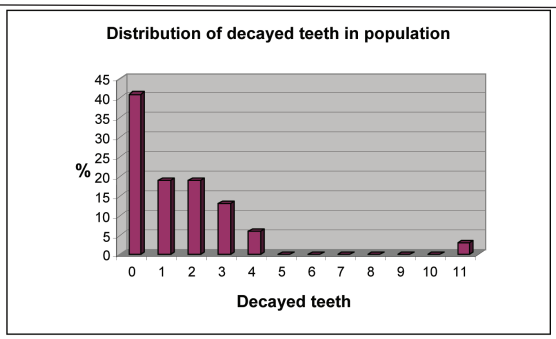


Figure 1: Relative distribution of decayed teeth in 12-yr-old population
%- per cent

Table 3: Relative distribution of DMFT scores in 12-year old population

| DMFT | Number | % | Cum | Cum % |
|---|---|---|---|---|
| 0 | 13 | 40.63 | 0 | 40.63 |
| 1 | 3 | 9.38 | 13 | 59.38 |
| 2 | 6 | 18.75 | 19 | 78.13 |
| 3 | 3 | 9.38 | 25 | 90.63 |
| 4 | 5 | 15.63 | 29 | 96.88 |
| 5 | 0 | 0.00 | 31 | 96.88 |
| 6 | 1 | 3.13 | 31 | 96.88 |
| 7 | 0 | 0.00 | 31 | 96.88 |
| 8 | 0 | 0.00 | 31 | 96.88 |
| 9 | 0 | 0.00 | 31 | 96.88 |
| 10 | 0 | 0.00 | 31 | 96.88 |
| 11 | 1 | 3.13 | 32 | 100.00 |

Tables 4 and 5 show the breakdown of caries experience according to gender of the child (Table 4) and the occupation of the father (Table 5). In both cases, numbers of children in the survey were too small for significance testing.

Table 5: Caries experience of 12-year olds by father's occupation in Montserrat [Mean (SD)]

| Parent occupation | D | M | F | DMFT | Sound teeth |
|---|---|---|---|---|---|
| Legislators | 1 | 0 | 0 | 1 | 27 |
| Professionals | 1.29 | 0.14 | 0.29 | 1.71 (2.43) | 25.57 |
| Technicians | 1 | 0 | 0 | 1 (1) | 24.33 |
| Clerks | 1 | 0 | 1 | 2 (2.83) | 26 |
| Service workers | 0.6 | 0 | 0.4 | 1 (1.41) | 27 |
| Skilled agricultural | 3 | 0 | 0 | 3 (1.41) | 25 |
| Craft and trade | 3 | 0.17 | 0.17 | 3.33 (3.93) | 24.67 |
| Plant and machine | 0 | 0 | 0 | 0 | 28 |
| Elementary occupations | – | – | – | – | – |
| Armed forces | – | – | – | – | – |
| Not given | 2.33 | 0 | 1 | 3.33 (1.15) | 24.67 |

However, there does not appear to be any difference in overall caries experience between males and females but there is a trend towards greater caries experience in non-professional groups based on parents occupation. Three children did not give a paternal occupation (Table 1). Five of the 32 subjects were randomly selected and re-examined at the completion of the main survey to determine intra-examiner reliability. The result of the Kappa test was a score of 1 indicating good agreement.

Table 7 shows the distribution of some responses to individual items on the Child Perceptions Questionnaire for the 32 children surveyed. Most children (78%) rated their oral health as "good" or better. The worst commonly reported items were breathing through the mouth, slow eating, food sticking between teeth, feeling upset or nervous about appearance of teeth, difficulty doing homework because of problems with the mouth or teeth and difficulty drinking or eating foods. In comparison to data provided in the original development of the CPQ, the present sample reports low levels of oral symptoms but increased functional limitation (Table 6). A lower score represents a lesser impact on QoL than a higher score. Overall, there appears to be no difference in emotional and social well-being between the

Table 4: Caries experience of 12-year olds by gender in Montserrat [mean (SD)]

| Gender | D | M | F | DMFT | CI | Sound Teeth |
|---|---|---|---|---|---|---|
| M | 1.39 (2.64) | 0.06 (0.24) | 0.28 (0.67) | 1.72 (2.93) | 0.27–3.18 | 25.56 (3.07) |
| F | 1.71 (1.38) | 0.07 (0.27) | 0.36 (0.63) | 2.14 (1.46) | 1.30–2.99 | 25.86 (1.46) |
| Overall mean | | | | | | **25.69 (2.47)** |

CI = Confidence interval

Table 6: Descriptive statistics for the CPQ

| | **Males (19)** | | **Females (13)** | | **Total** | | **Jokovic *et al* 2002** | |
|---|---|---|---|---|---|---|---|---|
| QoL | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Oral symptoms | 3.00 | 3.27 | 3.15 | 2.44 | 3.06 | 2.92 | **6.3** | **3.4** |
| Functional limitations | 7.61 | 6.04 | 9.82 | 6.98 | 8.45 | 6.39 | **6.7** | **4.9** |
| Emotional well-being | 6.89 | 4.97 | 6.23 | 5.23 | 6.63 | 5.00 | **6.4** | **5.7** |
| Social well-being | 7.00 | 6.10 | 5.92 | 7.38 | 6.56 | 6.55 | **6.9** | **6.4** |
| **Total** | **24.28** | **18.01** | **23.44** | **22.15** | **24.00** | **19.06** | **26.3** | **16.7** |

Table 7: Results of the CPQ: scores for some items of health impact on QoL

| **Item** | **Excellent n (%)** | **Very Good** | **Good** | **Fair** | **Poor** |
|---|---|---|---|---|---|
| Oral health | 7 (21%) | 7 (21%) | 12 (36%) | 5 (15%) | 2 (6%) |
| | Not at all N (%) | Very little | Some | A lot | Very much |
| Life overall | 18 (55%) | 10 (30%) | 2 (6%) | 1 (3%) | 2 (6%) |
| | Never | Once/twice | Sometimes | Often | Everyday/Almost every day |
| | N (%) | | | | |
| Upset | 11 (33) | 7 (21) | 8 (24) | 7 (21) | |
| Food stuck between teeth | 5 (15%) | 11 (33%) | 11 (33%) | 3 (9%) | 3 (9%) |
| Difficulty doing homework | 18 (55) | 6 (18) | 3 (9) | 5 (15) | 1 (3) |
| Breathing through mouth | 9 (27) | 10 (30%) | 4 (12%) | 6 (18%) | 3 (9%) |
| Slow eating | 14 (42) | 5 (15%) | 8 (24%) | 1 (3%) | 5 (15%) |

current sample and the Canadian children reported by Jokovic *et al,* 2002 (3).

## DISCUSSION

The results of this study indicate that the sample of 12-year olds examined have a mean DMFT of 1.91. This indicates that Montserrat has achieved the oral health goal set by WHO of reaching a mean DMFT score of ≤ 3 by 2000 (4). The mean number of Decayed teeth being 1.53 (CI 0.75, 2.31) contributes the highest proportion of the total figure (D = 1.53, M = 0.06, F = 0.31). The majority of children examined (59% with D > 0) were experiencing some form of active decay thus requiring (professionally judged) treatment. The indication is that there were quite high levels of untreated decay amongst this population of children examined and consequently high normative needs. This may imply that current services are failing to meet this need.

The filled component of the DMFT score was also fairly small at 0.31 (0.64) and this was also reflected by a low Care Index of 16%. Based on the information collected that there was high active caries and little restorative care in the children examined, it is reasonable to presume that the free government service in Montserrat may be underutilized. The mean number of missing (extracted due to caries) teeth was less than 1. One possible explanation is that children are not accessing dental care and receiving treatment. It is difficult to determine from this small sample size whether the higher DMFT scores observed in females was statistically significant.

In this study, the children of professional fathers had lower caries prevalence than children of non-professional fathers (Table 5). Socio-economic status has been linked with oral health status and indeed there is evidence that persons of lower socio-economic status often have worse health than persons of higher socio-economic status (5).

The quality of life data showed most children regarded their oral health as "good" or "better." They also reported a low level of oral symptoms despite having increased levels of functional limitations. Overall QoL scores for oral symptoms and functional limitations differed significantly from scores attained in the Canadian study by Jokovic *et al*. The oral symptoms score was less than scores in the Canadian study while that for functional limitations was higher. It is possible that the children were under-reporting their

symptoms. Another explanation could be that children did have significant oral symptoms but had managed to cope with them and were accepting them as normal.

It is concluded that there is a need for improved delivery of restorative care coupled with oral health promotion and dental health education.

**ACKNOWLEDGEMENTS**

I am indebted to the students who participated and their parents who consented. The support and assistance of the principal and staff of the Montserrat Secondary School and the Ministry of Education Health and Community Services were beyond expectation. Special thanks to the staff of the St John's Dental Clinic who assisted ably and efficiently with examinations. Thanks to Supervisors Dr Nick Kendell, Professor Tim Newton and Dr Blanaid Daly whose combined input was invaluable and greatly appreciated.

**REFERENCES**

1. Pine CM, Pitts NB, Nugent ZJ. British association for the study of community dentistry (BASCD) guidance on the statistical aspects of training and calibration of examiners for surveys of child dental health. A BASCD coordinated dental epidemiology programme quality standard. Community Dental Health 1997; **13** (**Suppl 1):** 18–29.
2. Pine C, Burnside G. BASCD Trainers' Pack for caries prevalence studies. University of Dundee, Dundee 2004;
3. Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. J Dent Res 2002; **8:** 459–63.
4. Fèdèration Dentaire International/WHO Global goals for oral health in the year 2000. Internat Dent J 1982; **32:** 74–7.
5. Watt R, Sheiham A. Inequalities in oral health: a review of the evidence and recommendations for action. Brit Dent J 1999; **187:** 6–12.